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Utah Geological Survey

Project: Center Creek Aggregate Pit Evaluation (NE1/4SE1/4 section 24, T.4S., R.5E., SLBLM)			Requesting Agency: Utah Division of Oil, Gas and Mining
By: Bryce T. Tripp Utah P.G. #5242857	Date: 11/16/2008	County: Wasatch	Job No:  Energy and Minerals-08-01
USGS Quadrangle: Center Creek (1:24,000)			

## INTRODUCTION

### Study Area

The Center Creek pit is located in the NE1/4SE1/4 section 24, T.4S., R.5E. (Salt Lake Base Line and Meridian) in Center Creek Canyon southeast of Heber City in Wasatch County (UTM Zone +12, NAD 83 = 4478206 N, 472471 E). The pit outline is colored red on figure 1.

### Purpose

The Utah Geological Survey (UGS) was requested by the Utah Division of Oil, Gas and Mining (DOGM) to examine the Center Creek pit and describe the nature and origin of the material being mined, to aid in DOGM's determination of whether it falls within Utah's mining regulation exemption for sand and gravel and rock aggregate or whether it is mining that would be subject to state regulation.

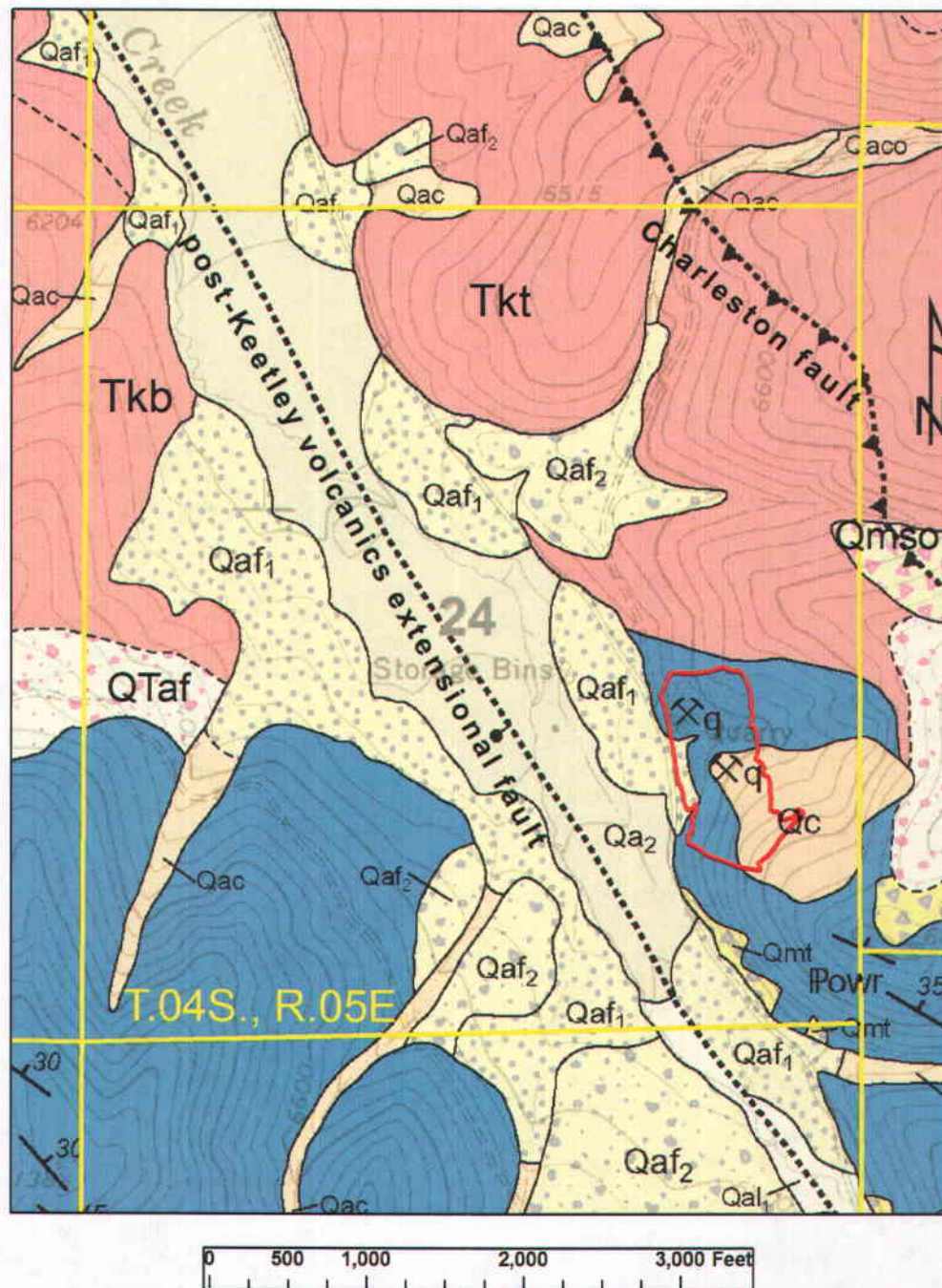


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- |                                       |  |
|---------------------------------------|--|
| Qmt -- Talus                          | QTaf -- Quat./Tert. alluvial fans                                    |
| Qal1 -- Alluvial deposits             | Tkb -- Volcanic breccia of Coyote Canyon                             |
| Qc -- Colluvium                       | member of Keetley Volcanics  |
| Qac -- Mixed alluvium and colluvium   | Tkt -- Tuffaceous unit of Keetley Volcanics                          |
| Qaco -- Older alluvium and colluvium  | IPowr -- Wallsburg Ridge Member of the Oquirrh Fm.                   |
| Qaf1 -- Alluvial fan deposits         |  |
| Qaf2 -- Level 2 alluvial fan deposits |  |
| Qaf4 -- Level 4 alluvial fan deposits |  |
| Qmso -- Older landslide deposits      |  |
| Qa2 -- Valley-fill deposits           |  |
|                                       | --▲-- Thrust fault (concealed) - teeth on upper plate                |
|                                       | --■-- High-angle fault (concealed) - ball and bar on downthrown side |
|                                       | 35 Strike and dip of bedding   |
|                                       | Xq Quarry  |

Figure 1. Geologic setting of the Center Creek aggregate pit, 6 miles southeast of Heber City, Wasatch County, Utah. Geologic map modified from Biek and others (2003). Pit outline (in red) from 2006, 1-meter-resolution National Agricultural Imagery Program photo.

### **Work Performed**

On August 20th, 2008, I accompanied Paul Baker of DOGM on a field examination of the Center Creek Canyon pit. We walked throughout the pit examining and photographing the excellent, fresh exposures in the recently mined pit highwall. We were then met by Paul Taylor, a retired petroleum geologist, who represents the Church of Jesus Christ of Latter-Day Saints, which owns the pit. Mr. Baker and I discussed the geologic setting of the pit with Mr. Taylor, based on information from a geologic map of the area by Biek and others (2003) and our examination of the pit.

### **GEOLOGIC SETTING**

The geology of the region in which the Center Creek pit is located is dominated by the Charleston thrust fault, a large, Sevier-age, west-to-east-directed thrust fault that places Pennsylvanian Oquirrh Formation rocks against younger Cretaceous Frontier Formation. The Charleston thrust may be as young as Paleocene age. The area was subsequently buried under the late Eocene to early Oligocene Keetley Volcanics. High-angle faults, related to extensional tectonics later cut the thrust sheet and overlying volcanic rocks (Biek and others, 2003). A variety of Pleistocene and Holocene stratigraphic units of alluvial, colluvial, and landslide origin then capped the area.

### **PIT GEOLOGY**

The Center Creek pit is located about 1500 feet southwest of the concealed leading edge of the Charleston thrust and about 600 feet northeast of a post-Keetley Volcanics extensional fault that has about 800 feet of down-to-the-south displacement (Biek and others, 2003). The geologic unit



mined at the pit is fractured Pennsylvanian Wallsburg Ridge Member of the Oquirrh Fm. which was described by Biek and others (2003) as a "monotonous mass of yellowish-brown, fine- to medium-grained, well-indurated, siliceous sandstones (orthoquartzite) that typically contain 2 to 5 percent feldspar." The Oquirrh orthoquartzite at the pit is overlain by a thin veneer of alluvial fan material (Qaf1) and colluvium (Qc) (figures 1 and 2) but almost all of the material being removed from the pit is highly brecciated Oquirrh orthoquartzite bedrock (IPowr) (figures 1 and 3). Figure 3 shows a typical view of the material being mined. It is well consolidated bedrock and its utility as aggregate is not due to sedimentary processes (rounding, sorting, and winnowing) but to tectonic processes (brecciation). I believe that the average industrial mineral geologist would classify this pit as a crushed stone operation.

The intense brecciation of the Oquirrh at the Center Creek pit is probably due to the pit's position between the leading edge of the Charleston thrust and the extensional fault along Center Creek. The brecciation is very desirable for a crushed stone operation because mining brecciated rock requires less blasting and crushing.

#### **REFERENCE**

Biek, R.F., Hylland, M.D., Welsh, J.E., and Lowe, Mike, 2003, Geologic map of the Center Creek quadrangle, Wasatch County, Utah: Utah Geological Survey Map 192, scale 1:24,000, 25 p.



Figure 2. Southeast end of Center Creek pit showing thin veneer of colluvium (Qc) at top of pit (above red line) over fractured orthoquartzite (IPowr) which forms the highwall from the red line down to the pit floor; the color change one-third of the way down from the top of the quarry marks the location of a mining bench.





Figure 3. Typical view of extreme brecciation of the well-consolidated orthoquartzite in the Oquirrh Formation (IPowr) of the Center Creek pit.